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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/784,958	02/25/2004	Makoto Suzuki	118851	8447

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EXAMINER	
EDWARDS, LOREN C	
ART UNIT	**PAPER NUMBER**
3748	

DATE MAILED: 01/20/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/784,958	SUZUKI ET AL.	
	Examiner	Art Unit	
	Loren C. Edwards	3748	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☐ Claim(s) _____ is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-10,12 and 14-19* is/are rejected.

7)☒ Claim(s) *11 and 13* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *25 February 2004* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

*See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *7/12/05 & 2/25/04*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Priority

1. Acknowledgment is made of applicant's claim for foreign priority under 35 U.S.C. 119(a)-(d). The certified copy has been placed on record.

Information Disclosure Statement

2. The information disclosure statement (IDS) submitted on 7/12/05 is in compliance with the provisions of 37 CFR 1.97. Accordingly, the examiner is considering the information disclosure statement.

3. The information disclosure statement (IDS) submitted on 2/25/04 is in compliance with the provisions of 37 CFR 1.97. Accordingly, the examiner is considering the information disclosure statement.

Drawings

4. The drawings are objected to because the combustion device, number 9 in Figures 1, 2, 3, 4, 5, and 6 is spelled "combustion device". Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement

sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the examiner does not accept the changes, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

6. Claims 1 and 14-18 are rejected under 35 U.S.C. 102(e) as being clearly anticipated by Botti et al. (U.S. Pat. No. 6,655,325). Botti discloses an internal combustion engine with a fuel cell in an exhaust system. The engine comprising: a fuel cell having a fuel electrode side thereof connected with an exhaust passage of the internal combustion engine (Fig. 1, No. 110; Col. 2, Line 62 – Col. 3, Line 12); a fuel supply system that supplies power generation fuel for the fuel cell to an exhaust passage at a location downstream of the internal combustion engine and upstream of the fuel cell (Fig. 1, No. 33 and 34; Col. 2, Line 62 – Col. 3, Line 12); and a supply

amount control part that controls an amount of power generation fuel supplied by the fuel supply system (Claim 13).

7. In regards to claim 14, Botti discloses the internal combustion engine with a fuel cell in an exhaust system as set forth in claim 1 and described above, and further comprising a catalyst having oxidation capability that is installed on the exhaust passage at a location downstream of the fuel cell (Fig. 1, No. 135; Col. 3, Lines 13-23).

8. In regards to claim 15, Botti discloses the internal combustion engine with a fuel cell in an exhaust system as set forth in claim 14 and described above, and further comprising an oxygen supply device that supplies oxygen to the catalyst having oxidation capability (Fig. 1, No. 39 and 135). It is pointed out that the indicated oxygen source is the exhaust stream, which inherently contains oxygen.

9. In regards to claim 16, Botti discloses the internal combustion engine with a fuel cell in an exhaust system as set forth in claim 15 and described above, and further wherein the oxygen supply device supplies the oxygen discharged from an air electrode side of the fuel cell to the catalyst (Fig. 1, No. 23 and 110).

10. In regards to claim 17, Botti discloses the internal combustion engine with a fuel cell in an exhaust system as set forth in claim 1 and described above, and further comprising a heat exchanger installed on the exhaust passage at a location downstream of the fuel cell (Fig 1, No. 115; Col. 3, Lines 13-23).

11. In regards to claim 18, Botti discloses the internal combustion engine in an exhaust system as set forth in claim 17 and described above, and further comprising an air supply passage that has the heat exchanger installed thereon and is connected with

an inlet side of an air electrode of the fuel cell, wherein air whose temperature is raised due to the heat of an exhaust gas in the heat exchanger is supplied into the air electrode of the fuel cell through an air supply passage (Fig. 1, No. 115 and 10; Col. 2, Line 62 – Col. 3, Line 23).

Claim Rejections - 35 USC § 103

12. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which the subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

13. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

14. Claims 2, 5-10, and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Botti in view of Gagnon (4,098,960). Botti discloses the internal combustion engine with a fuel cell in an exhaust system as set forth in claim 1, as described above, but fails to specifically discuss the fuel supply control controlling the amount of power generation fuel such that the power generated becomes equal to a target amount. Gagnon discloses a fuel cell fuel control system that controls the

amount of fuel supplied to the fuel cell based on the demand of the system (Abstract; Col. 2, Lines 1-10). It would have been obvious to one having ordinary skill in the art at the time the invention was made to utilize the fuel control system as taught by Gagnon in the system of Botti by inserting the Gagnon system at the location illustrated in Figure 1A below, for the advantage of excellent transient response in the system (Col. 1, Lines 66-68).

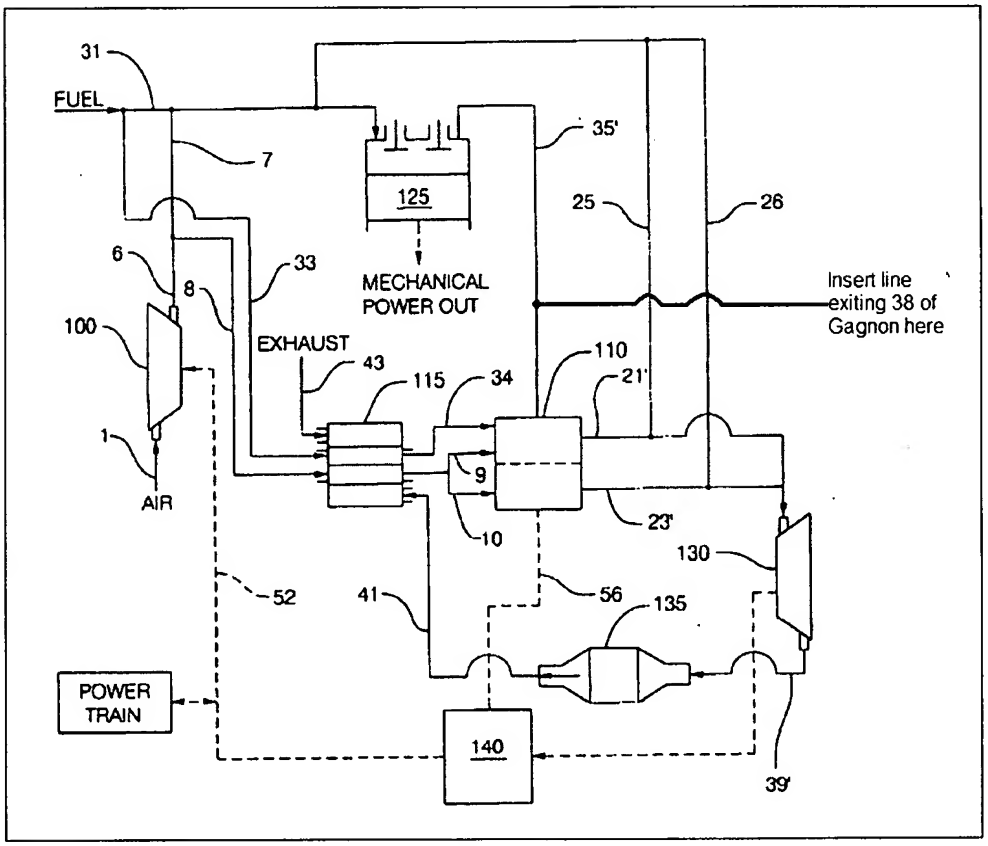

Figure 1A.

15. In regards to claim 5, the modified Botti, as described above, discloses the internal combustion engine with a fuel cell in an exhaust system as set forth in claim 1,

and further comprising a temperature detection device that detects a state of an element related to the temperature of the fuel cell, wherein the supply amount control part controls the amount of power generation fuel supplied by the fuel supply system based on the result of detection of the temperature detection device (Gagnon; Col. 2, Lines 10-30).

16. In regards to claim 6, the modified Botti, as described above, discloses the internal combustion engine with a fuel cell in an exhaust system as set forth in claim 5, and further wherein when the temperature of the fuel cell is below a prescribed temperature the supply amount controller decreases the amount of supplied fuel (Gagnon; Col. 2, Lines 10-30).

17. In regards to claim 7, the modified Botti, as described above, discloses the internal combustion engine with a fuel cell in an exhaust system as set forth in claim 1, and further comprising a combustion device, wherein the fuel supply system supplies an exhaust gas discharged from the combustion device to the exhaust passage at a location downstream of the internal combustion engine and upstream of the fuel cell (Figure 1A; Gagnon; Fig. 1, No. 36; Col. 3, Lines 29-61).

18. In regards to claim 8, the modified Botti, as described above, discloses the internal combustion engine with a fuel cell in an exhaust system as set forth in claim 7, and further wherein the fuel supply system supplies the exhaust gas discharged from the combustion device to the exhaust passage at a location downstream of the internal combustion engine and upstream of the fuel cell (Figure 1A), with combustion in the

combustion device being performed with a mixture of a rich air fuel ratio (Gagnon; Col. 3 Lines 45-48).

19. In regards to claim 9, the modified Botti, as described above, discloses the internal combustion engine with a fuel cell in an exhaust system as set forth in claim 7, and further wherein the fuel supply system supplies an unburnt gas discharged from the combustion device to the exhaust passage at a location downstream of the internal combustion engine and upstream of the fuel cell without combusting the fuel in the combustion device (Gagnon; Col. 2, Lines 10-30).

20. In regards to claim 19, the modified Botti, as described above, discloses the internal combustion engine with a fuel cell in an exhaust system as set forth in claim 7, and further comprising a heat exchanger installed on the exhaust passage at a location downstream of the fuel cell (Figure 1A, No. 130), and an air supply passage that has the heat exchanger installed thereon and is connected with the combustion device (Gagnon; Fig. 1, No. 74).

21. In regards to claim 10, the modified Botti, as described above, discloses the internal combustion engine with a fuel cell in an exhaust system as set forth in claim 7, and further wherein the supply amount control part controls the amount of power generation fuel supplied by the fuel supply system by changing an air fuel ratio of a gas combusted in the combustion device (Gagnon; Col. 2, Lines 10-30).

22. Claims 3 and 4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Botti in view of Tsukui et al. (U.S. Pat. No. 4,629,664). Botti discloses the internal combustion engine with a fuel cell in an exhaust system as set forth claim 2, as

described above, but fails to specifically discuss the existence of a fuel amount detection device that detects an amount of power generation fuel contributing to the power generation of the fuel cell, wherein the fuel supply amount control part controls the amount of power generation fuel supplied by the fuel supply system based on the result of detection of the fuel amount detection device. Tsukui discloses a liquid fuel cell control system that has a detection device for the supplied fuel, and controls the supply of fuel based on the value detected (Col. 5, Lines 25-52). It would have been obvious to one having ordinary skill in the art at the time the invention was made to utilize the fuel supply control means as taught by Tsukui in the system of Botti for the advantage of a more efficient fuel cell.

23. In regards to claim 4, the modified Botti, as described above, discloses the internal combustion engine with a fuel cell in an exhaust system as set forth in claim 3, and further wherein the amount of power generation fuel contributing to the power generation of the fuel cell detected by the fuel amount detection device is smaller than a target amount, the supply amount control part increases the amount of power generation fuel supplied by the supply system (Tsukui; Col. 5, Line 62 – Col. 6, Line 2).

24. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Botti in view of Meacham (U.S. Pat. No. 6,502,533). Botti discloses the internal combustion engine with a fuel cell in an exhaust system as set forth in claim 1, as described above, but fails to fully describe the system comprising a catalyst having oxidation capability that is installed on the exhaust passage at a location upstream of the fuel cell and downstream of the fuel supply system. Meacham discloses an internal combustion fuel

reforming system that utilizes a zinc oxide catalyst in the exhaust stream upstream of a fuel sell (Fig. 4, No. 22; Col. 6, Lines 53-67). It would have been obvious to one having ordinary skill in the art at the time the invention was made to utilize the catalyst as taught by Meacham in the system of Botti for the advantage of removing hydrogen sulfide from the exhaust (Col. 6, lines 66-67).

Allowable Subject Matter

25. Claims 11 and 13 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

26. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Botti et al. (U.S. Pat. No. 6,230,494) discloses a power generation system and method; Meacham (U.S. Pat. No. 6,502,533) discloses an internal combustion fuel reforming system.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Loren C. Edwards whose telephone number is (571) 272-2765. The examiner can normally be reached on M-TH 5:30-4.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Thomas Denion can be reached on (571)272-4859. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Loren Edwards

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